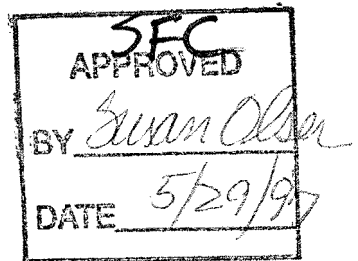


UNITED STATES
DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
State, Federal & Constituent Programs Division



(REVISED) FINAL REPORT

Grantee: PENNSYLVANIA FISH AND BOAT COMMISSION

Project No: N/A

Grant No: NA56FU0415

Project Title: IMPEDIMENTS TO FISH PASSAGE IN PENNSYLVANIA
TRIBUTARIES TO THE SUSQUEHANNA RIVER - PHASE III

Period Covered: 06/30/95 - 09/30/96

Prepared: ROBERT CARLINE, CALEB J. TZILKOWSKI, PATRICK M. KOCOVSKY

Approved by: BRIAN BARNER

Date: MARCH 31, 1997

Statutory Funding Authority: Anadromous Fish Conservation Act
(P.L. 89-304)

- ☒ Chesapeake Bay Studies
- ☐ Endangered Species Act
- ☐ Interjurisdictional Fisheries
Act (Title III of P.L. 99-659)
- ☐ Magnuson Act
- ☐ Oyster Disease Research
- ☐ Saltonstall-Kennedy
- ☐ Unallied Industry Projects
- ☐ Unallied Science Projects

Final Report Phase III

NOAA Grant Award NA46FU0218 ^{56 FU0415}

Submitted by:

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The Pennsylvania State University
College of Agricultural Sciences
School of Forest Resources

Impediments to Fish Passage in Pennsylvania Tributaries
to the Susquehanna River- Phase III

Submitted to:

The Pennsylvania Fish and Boat Commission
1225 Shiloh Road
State College, PA 16801-8495
Attn: R. Hoopes

Period Covered:

June 30, 1995 to September 30, 1996

Date Prepared:

March 31, 1997

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Impediments to Fish Passage in Pennsylvania Tributaries
to the Susquehanna River - Phase III

INTRODUCTION

Migration of anadromous fish from the Chesapeake Bay into the Susquehanna River has been restricted since construction of four hydropower dams in the early part of the 20th century. In 1991, a fish lift was opened at Conowingo Dam, MD, (Fig. 1). In June 1993, agreement was finalized among agencies and utilities that own and operate the next three upstream dams. The agreement calls for provision of passageways at these dams to enable migratory fish to reach historical spawning grounds on the Susquehanna River. However, blockages on many tributaries prevent migratory fishes from reaching potential spawning areas. There is no complete inventory of existing blockages on these tributaries, nor is there any measure of the amount of suitable spawning and rearing habitat that would be available to migratory fishes, if passages were provided at these blockages.

Removal of tributary blockages would allow migratory fish access to potential spawning and rearing areas. However, successful colonization of these areas is dependent upon a host of other factors.

The objectives of this project are to: (1) inventory blockages to fish passage on tributaries to the Susquehanna River, and (2) identify the quantity and quality of habitat that could be made available to anadromous fish species if passage were provided at the

blockages. The information derived from this study will contribute to the establishment of priorities for fish passage construction.

FISH SPECIES OF INTEREST

This project focused on alewife and blueback herring. These species typically spawn in small streams, whereas American shad and striped bass tend to spawn in main stem habitats of large rivers.

GEOGRAPHIC SCOPE

Blueback herring can migrate more than 300 miles into freshwater and spawn in streams with flows as low as 5 cfs (cubic feet per second). Thus, their potential range includes nearly the entire Pennsylvania portion of the Susquehanna River basin. If all tributaries with such small flows were surveyed, the entire project would take many years to complete. Rather, we surveyed a portion of tributaries that may provide habitat for river herring. The following criteria were used to determine location at which tributary surveys would be terminated.

- (a) A natural blockage was encountered. Normally surveys would end at a natural blockage because, presumably, river herring are not able to pass over or through natural blockages such as waterfalls or cataracts. If we were uncertain that a natural feature would constitute a blockage to migration, the survey continued upstream.
- (b) A dam ≥ 40 ft in height was encountered. Providing passage facilities for fish over large dams would be expensive and would pose technical difficulties. Such dams would have low priority for removal or construction of fish passage facilities.
- (c) A stream changed from third order to second order. For tributaries in the lower basin,

this change corresponds to a watershed area of about 10 square miles and a summer flow of 8 cfs. Surveys were terminated on third order tributaries if base-flow was <8 cfs.

For the third phase of this study, we surveyed Fishing Creek (York County), Swatara Creek, Yellow Breeches Creek, Conodoguinet Creek, Fishing Creek (Perry County), and Shermans Creek. Swatara Creek, Conodoguinet Creek, Shermans Creek, and Fishing Creeks in York and Perry Counties (Fig. 2; Table 1).

Table 1. Streams within the Susquehanna River drainage surveyed August, 1995-August, 1996 for blockages of passage by anadromous fish.

Stream	County	Susquehanna River (mile)	Length Surveyed (mile)	Blockages encountered
Fishing Creek	York	54.1	8.0	3
Swatara Creek	Dauphin and Lebanon	57.2	90.8	5
Yellow Breeches Creek	Cumberland and York	62.8	42	13
Conodoguinet Creek	Cumberland and Franklin	66.9	70.1	4
Fishing Creek	Perry	71.8	5.0	5
Shermans Creek	Perry	78.4	51.1	7

- 1 Fishing Creek, York Co.
- 2 Swatara Creek
- 3 Yellow Breeches Creek
- 4 Conodoquinet Creek
- 5 Fishing Creek, Perry Co.
- 6 Sherman Creek
- 7 Susquehanna River

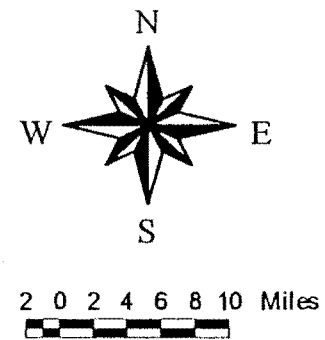
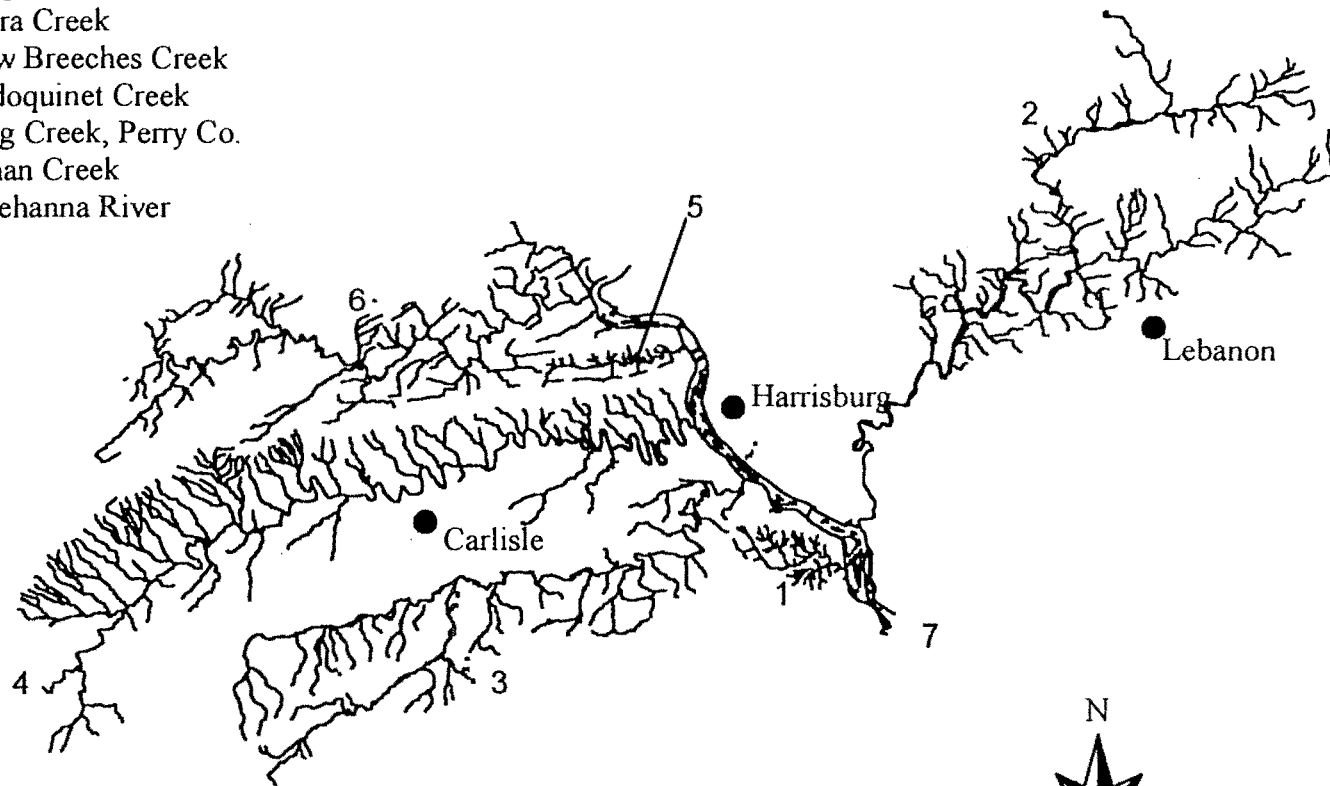


Figure 2. Streams surveyed during Phase III.

SURVEY METHODS

We assembled an initial list of blockages from data provided by the Pennsylvania Department of Environmental Protection (DEP), and from a report by the U.S. Army Corps of Engineers. Some of these blockages were known to no longer exist.

Reconnaissance Surveys: To confirm the locations of blockages, we inspected a set of 1992 aerial photographs (1:14,000) that covered the larger tributaries in the lower Susquehanna River basin. Not all candidate tributaries have been photographed. For areas without aerial photographs, we conducted on-ground visual surveys. For tributaries in which blockages were located, on-ground surveys began at the downstream-most blockage, and proceeded to the mouth to ensure that any natural blockages were identified.

Blockage Characterization: The Living Resources Subcommittee's Fish Passage Work Group selected a set of criteria to be used for blockage characterization. These criteria were employed during this survey and are to be used by all jurisdictions in the Chesapeake Bay drainage.

Habitat Surveys: All tributaries of the appropriate size that had one or more blockages were included in habitat surveys. At 0.25-mile intervals, beginning at the downstream-most blockage, observations were made concerning stream width, stream bank condition, and substrate. Although protocol for the survey did not call for pH measurements, some were recorded. Surveys continued upstream until we encountered large dams, natural blockages, or low flows; surveys ended when the tributary became second order. Pool to riffle-run habitat ratios were calculated for the drainages surveyed.

For Conodoguinet Creek, Swatara Creek, and Shermans Creek, GPS (Global Positioning System) was used to obtain coordinates for the upstream and downstream boundaries of pools encountered. Pool lengths were calculated by plotting these coordinates on topographic maps and measuring distances between the points. All habitat that was not pool habitat was considered riffle-run habitat.

For the smaller creeks surveyed, the standard method of calculating pool to riffle-run ratios could not be used. GPS could not accurately locate pool boundaries due to the relatively short pool and riffle-run lengths. We visually estimated the pool to riffle-run ratios within each 0.25-mile interval.

RESULTS

Fishing Creek: (*York County*)

Blockages: There are three blockages (Fig 3) on Fishing Creek (Table 2). Blockages ranged from 1.0 to 4.0 feet in height and impounded surface areas were 1.1 acres or less. Blockage characteristics are provided in Appendix I and riparian landowners in Appendix II.

Habitat: Fishing Creek runs through backyards in the upper reaches accounting for much of the grass and brush stream banks. The remainder of Fishing Creek's length was forested with no eroding stream banks observed at transect locations (Table 3). Fishing Creek was 39% pool habitat and 61% riffle-run habitat.

Water Quality: According to PADEP there was one permit issued in the Fishing Creek drainage. DEP personnel report no water quality problems in this basin.

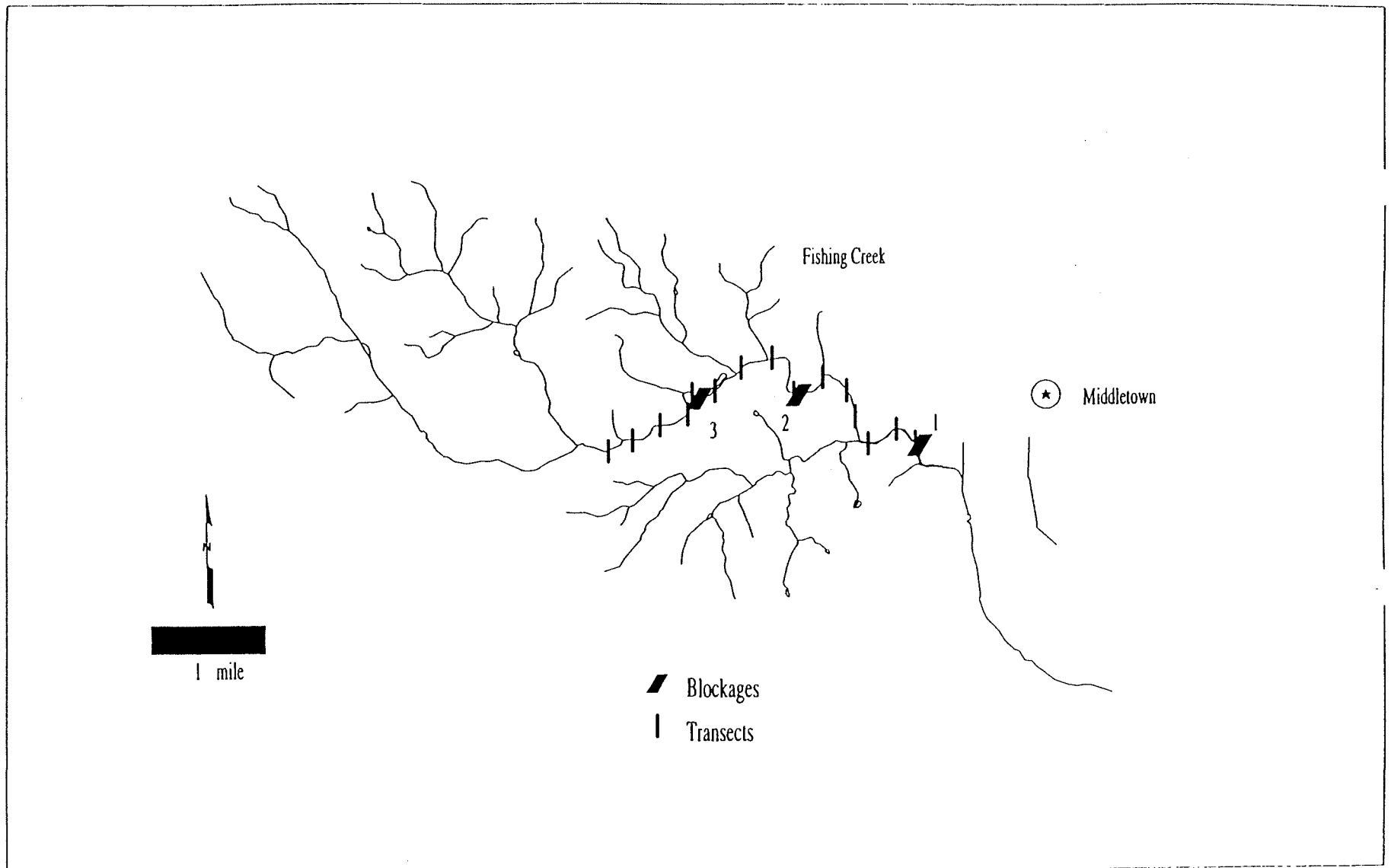


Figure 3. Transects and blockages surveyed on Fishing Creek, York County. Blockage numbers correspond with blockage identification numbers, e.g., 1-PAFIY001.

Table 2. Impounded area due to man-made blockages on Fishing Creek drainage surveyed July 1996, York County.

Blockage identification	Distance from mouth (miles)	Blockage height (feet)	Impounded area (acres)	Acres between blockages
PAFCY001	0.80	4.0	1.1	16
PAFCY002	2.10	1.0	0.15	17
PAFCY003	3.95	1.0	0.10	-

Table 3. Stream bank and substrate composition in the Fishing Creek drainage surveyed July 1996, York County.

Bank condition	Percent	Substrate	Percent
Forest	74	Fines	5
Brush	11	Sand or gravel	50
Grasses	15	Cobble	23
Riprap	0	Boulders	18
Eroding	0	Other	4

Swatara Creek (*Dauphin and Lebanon Counties*)

Blockages: The main branch of Swatara Creek had three man-made blockages (Fig 4). The downstream-most blockage was approximately 2.25 miles upstream of the Swatara Creek confluence with the Susquehanna River. A natural cataract 55.90 miles upstream of the Susquehanna River defined the survey endpoint on Swatara Creek. A large log and debris pile was found on Little Swatara Creek that was deemed impassable. Blockage heights on this drainage were relatively low (Table 4) and created impoundments that ranged from about 3 to 65 acres.

Habitat: Swatara Creek runs through residential areas in the lower portion of its length but upstream in Lebanon County it is surrounded by predominantly forest (62%)

(Table 5). Much of the eroding stream bank conditions (8%) were due not to agricultural use but to sharply bending meanders within the forested land.

Except for the upper portions, most of Swatara Creek was a 2-4 foot deep glide. Although the stream velocity was relatively fast, most of the habitat was considered pool condition (61%) because of its depth. The remaining 39% was riffle-run habitat.

Water Quality: There are 13 permitted discharges from municipal sewage treatment plants in the Swatara Creek basin. DEP personnel report no water quality problems in this basin, except for low pH mine drainage in the upper part of the basin. They noted improvement in the pH in recent years.

Table 4. Impounded areas due to man-made blockages on Swatara Creek drainage surveyed August 1995-June 1996, Dauphin and Lebanon Counties.

Blockage identification code	Distance from mouth (miles)	Blockage height (feet)	Stream	Impounded area (acres)	Acres between blockages
PASWA001	2.25	1.0-3.0	Swatara	40.0	243
PASWA002	13.00	6.0	Swatara	65.2	485
PASWA003	34.70	2.0	Swatara	5.1	282
PASWA004	50.1	2.0	Swatara	0*	-*
PASWA005	46.40	1.0-4.0	Little Swatara	3.62	106

* PASWA004 is a natural blockage

Table 5. Stream bank and substrate composition in the Swatara Creek drainage surveyed August 1995-June 1996, Dauphin and Lebanon Counties.

Bank condition	Percent	Substrate	Percent
Forest	62	Fines	5
Brush	20	Sand or gravel	48
Grasses	6	Cobble	24
Riprap	4	Boulders	19
Eroding	8	Other	4

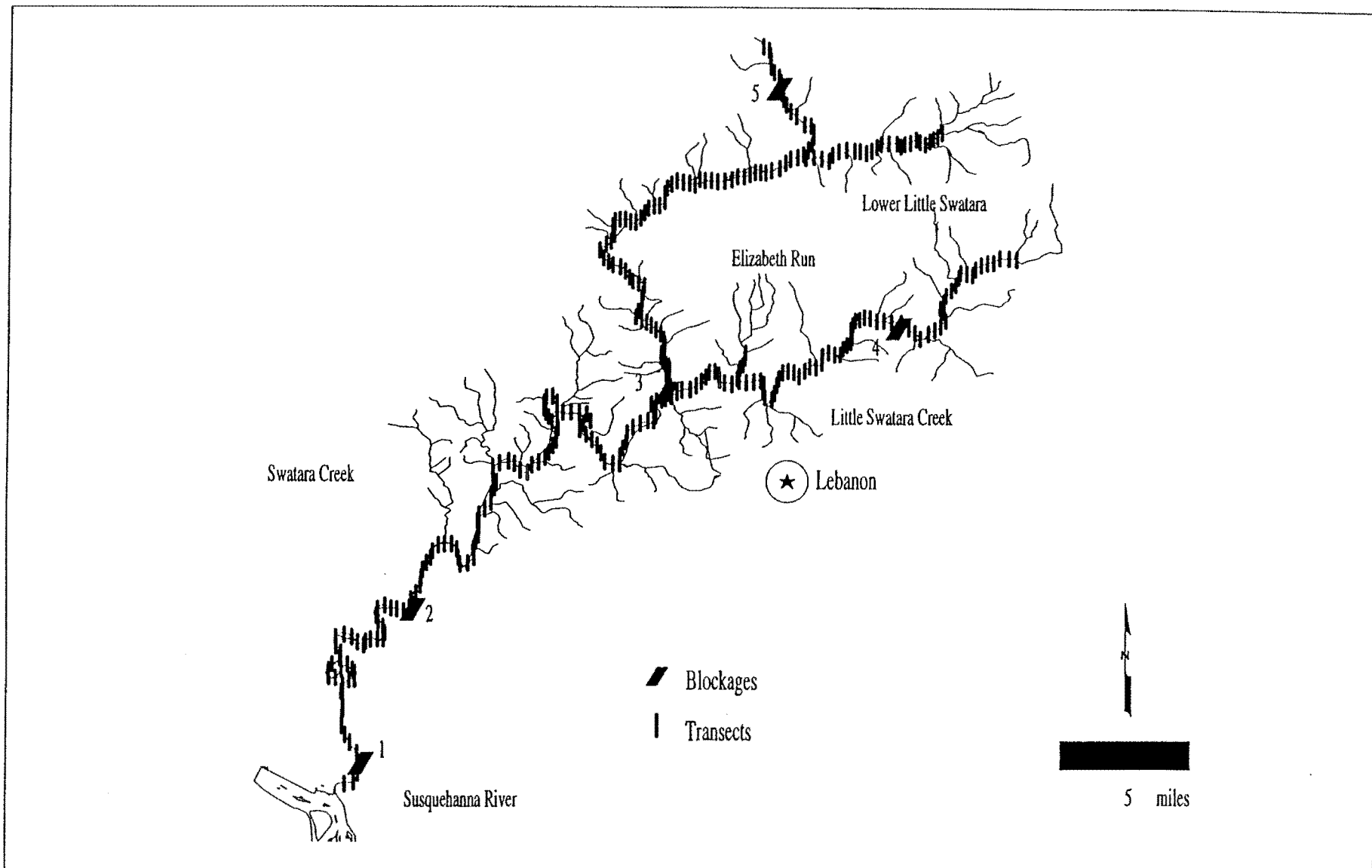


Figure 4. Transects and blockages surveyed on Swatara Creek, Dauphin and Lebanon Counties. Blockage numbers correspond with blockage identification numbers, e.g., 1 = PASWA001.

Yellow Breeches Creek: (Cumberland and York Counties)

Blockages: There were 13 blockages on the main stem of Yellow Breeches Creek (Fig. 5). Blockage heights ranged from 1.0 feet at river mile 41.8 to 7.0 feet at river mile 0.2 (Table 6). The surface areas of stream impounded by blockages ranged from <1 acre to 19.6 acres.

Habitat: Forest land and brush were the predominant stream bank cover types (Table 7). Only 1% of the stream bank was eroding. We used GPS locations to delineate the boundaries of riffles and pools. When these locations were plotted on stream maps, it was apparent that the resolution of these locations were not sufficiently accurate to describe pool and riffle boundaries; therefore, we were not able to estimate percentages of riffles and pools.

Water Quality: There are four domestic wastewater treatment plants in the Yellow Breeches watershed plus at least six other permitted discharges. DEP personnel report good water quality throughout the basin and no recent incidents of discharge permit violations.

Yellow Breeches Creek: (Cumberland and York Counties)

Table 6. Impounded area due to man-made blockages on Yellow Breeches Creek.

Blockage identification	Distance from mouth (miles)	Blockage height (feet)	Impounded area (acres)	Acres between blockages
PAYBR001	0.20	7.0	19.6	33
PAYBR002	3.20	3.0	9.0	24
PAYBR003	5.30	6.0	9.9	82
PAYBR004	13.30	3.5	6.6	69
PAYBR005	19.90	2.0	1.5	10
PAYBR006	20.70	4.0	16.7	26
PAYBR007	24.30	5.5	9.2	23
PAYBR008	26.80	3.5	5.4	14
PAYBR009	27.80	2.0	6.5	16
PAYBR010	28.90	4.5	13.6	8
PAYBR011	33.70	2.5	*	0
PAYBR012	34.10	2.0	0.44	28
PAYBR013	41.80	1.0	0.52	19

* Not Complete Blockage

Table 7. Stream bank composition of the Yellow Breeches Creek

Bank Condition	Percent
Forest	46
Brush	36
Grasses	16
Riprap	1
Eroding	1

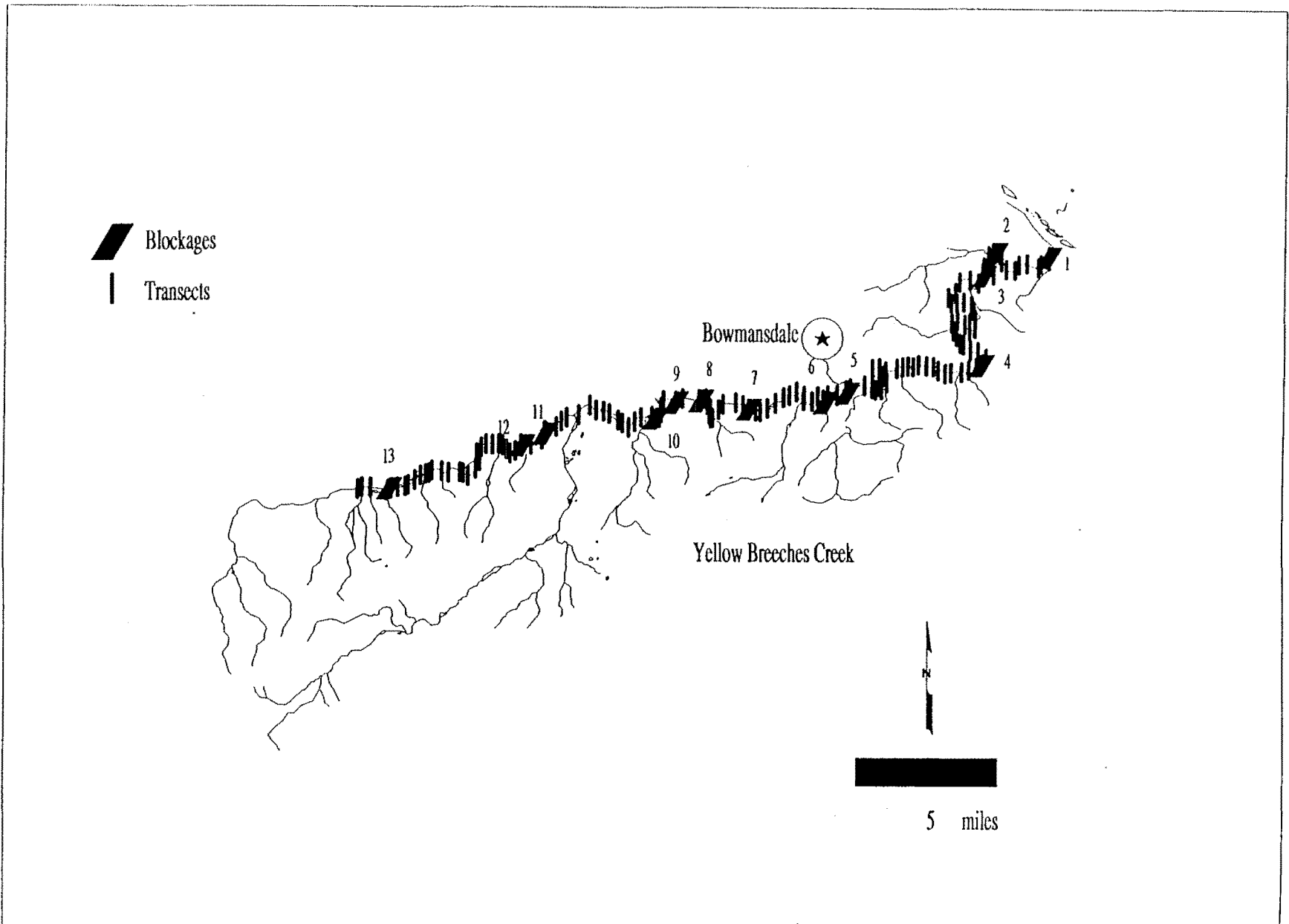


Figure 5. Transects and blockages surveyed on Yellow Breeches Creek, Cumberland and York Counties. Blockage numbers correspond with blockage identification numbers, e.g., 1=PAYBROO1.

Conodoguinet Creek: (Cumberland County)

Blockages: There were 4 blockages (Table 8) on Conodoguinet Creek (Fig. 6). These blockages ranged in height from 5 to 8 feet and impounded stream surface areas of about 28 to 67 acres.

Habitat: Forest land and brush were the predominant stream bank cover; only 2% of the stream bank was eroding (Table 9). Fifty-three percent of Conodoguinet Creek was pool habitat whereas 47% was riffle-run habitat. Because the survey of Conodoguinet Creek was conducted in the latter portion of phase II (August, 1995), in which substrate observation were not called for, substrate data were not collected.

Water Quality: There are nine permitted municipal sewage treatment plants in the Conodoguinet Creek basin. Pennsylvania Department of Environmental Protection (DEP) personnel report that there have been no problems with treatment plants in the watershed and water quality has been generally quite good. The only reported problems were a few incidents of low dissolved oxygen in early morning during summer months in a few impoundments in the lower part of the main stem. These dissolved oxygen sags were related to abundant macrophytes in these impoundments. No record of pH levels were taken on Conodoguinet Creek.

Table 8. Impounded area due to man-made blockages on Conodoguinet Creek drainage surveyed August 1995, Cumberland and Franklin counties.

Blockage identification code	Distance from mouth (miles)	Blockage height (feet)	Impounded area (acres)	Acres between blockages
PACGT001	13.2	5.5	51.1	412
PACGT002	35.7	8.0	54.7	201
PACGT003	43.0	5.6	28.1	100
PACGT004	49.7	7.6	67.2	136

Table 9. Stream bank composition of the Conodoguinet Creek drainage surveyed August, 1995, Cumberland and Franklin counties.

Bank condition	Percent
Forest	44
Brush	41
Grasses	12
Riprap	1
Eroding	2

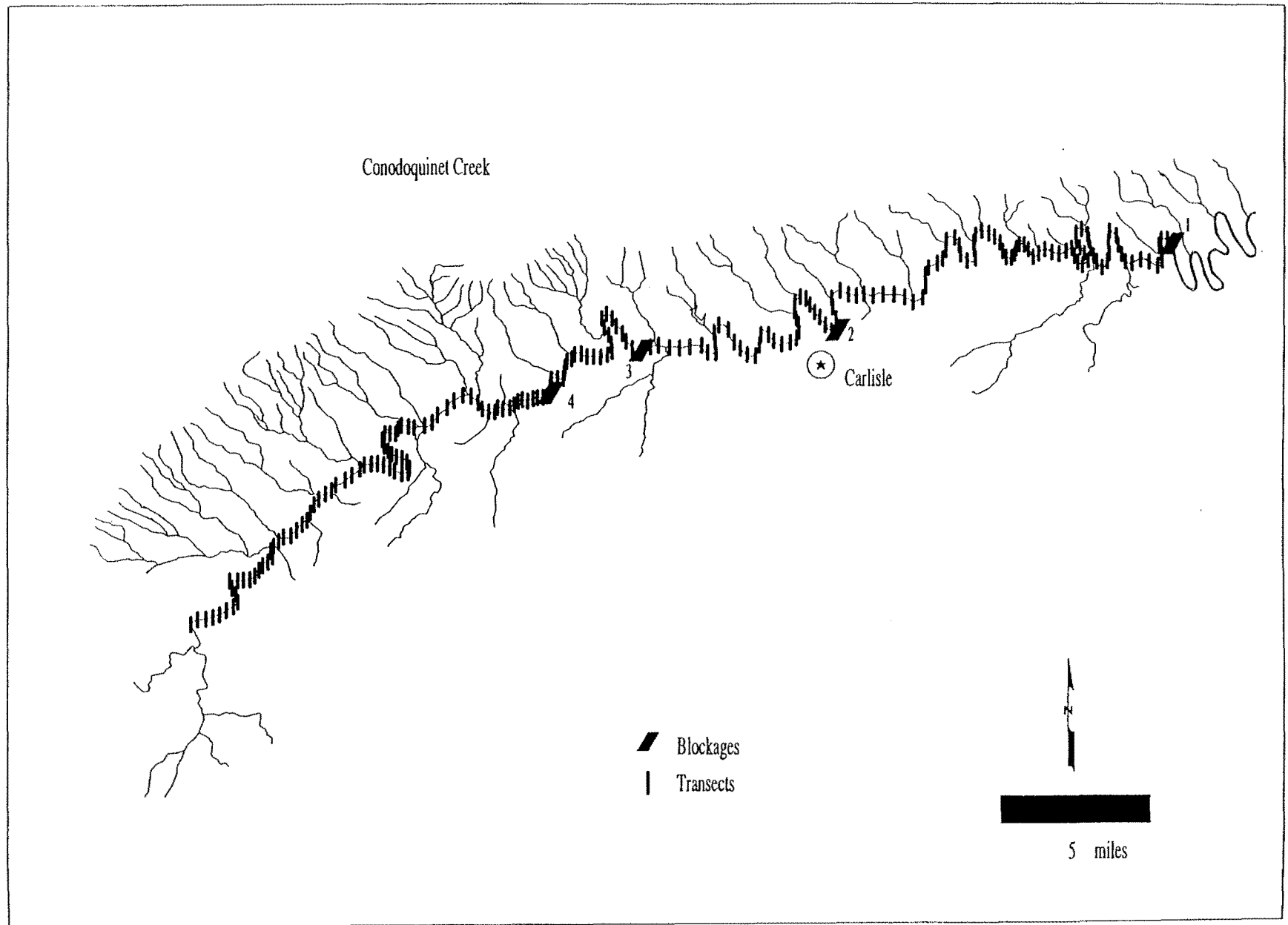


Figure 6. Transects and blockages surveyed on Conodoquinet Creek, Cumberland and Franklin Counties. Blockage numbers correspond with blockage identification numbers, e.g., 1 =PACGT001.

Fishing Creek: (Perry County)

Blockages: There were five blockages (Table 10) on Fishing Creek (Fig 7). The upper half of Fishing Creek was surveyed during high water conditions. During these high-water conditions three culverts were encountered that were, at the time, passable by river herring. Because these culverts may provide a vertical drop in lower water conditions they were considered blockages and included in the survey. The other 2 man-made blockages were 2-ft. high dams that impounded less than 1 acre each.

Habitat: Fishing Creek was predominantly forested (44%) for the lower portion and overgrown with brush (56%) in its upper reaches (Table 13). Thirty-four percent of Fishing Creek was pool habitat with the remaining 66% riffle-run habitat.

Water Quality: According to PADEP there were no discharge permits issued in the Fishing Creek drainage and no water quality problems. Average pH was 6.8.

Table 10. Impounded area due to man-made blockages on Fishing Creek drainage surveyed July 1996, Perry County.

Blockage identification code	Distance from mouth (miles)	Blockage height (feet)	Impounded area (acres)	Acres between blockages
PAFCP001	1.15	2.0	0.16	0.28
PAFCP002	3.95	2.0	0.12	17.7
PAFCP003	7.70	0.0*	0	1.6
PAFCP004	8.70	0.0*	0	0.55
PAFCP005	9.45	0.0*	0	0.95

*Culvert

Table 11. Stream bank and substrate composition in the Fishing Creek drainage surveyed July 1996, Perry County.

Bank condition	Percent	Substrate	Percent
Forest	44	Fines	3
Brush	56	Sand or gravel	55
Grasses	0	Cobble	18
Riprap	0	Boulders	18
Eroding	0	Other	6

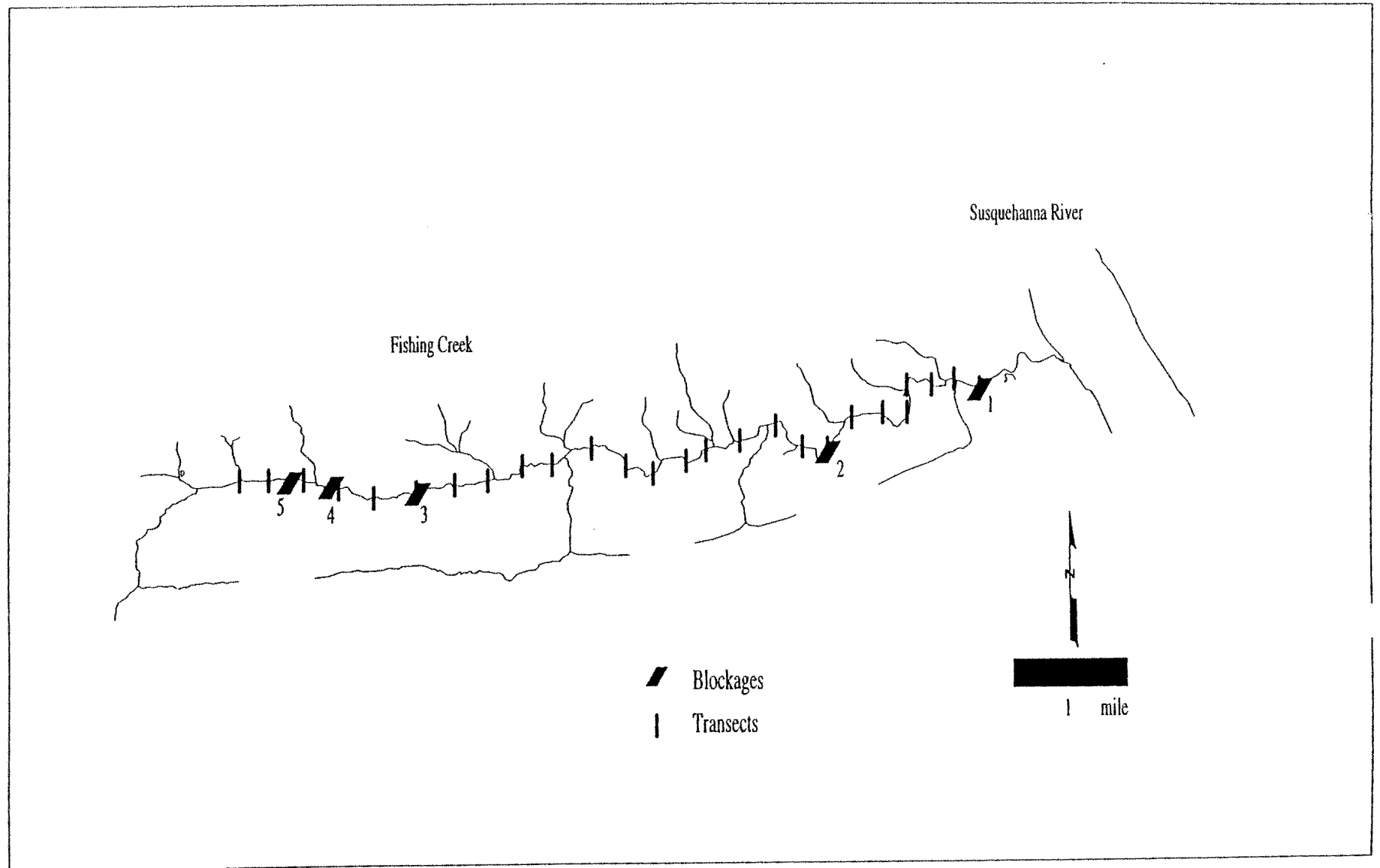


Figure 7. Transects and blockages surveyed on Fishing Creek, Perry County. Blockage numbers correspond with blockage identification numbers, e.g., 1 =PAFIP001.

Shermans Creek

Blockages: In total, seven blockages were on Shermons Creek and its third order tributaries (Fig 8), all of which were man-made. Shermons Creek contained four of the blockages and the remaining three were on its tributaries (Table 12). Blockage height on the Shermons Creek basin ranged from 0.5 to 12.0 feet and impounded surface areas of <1.0 to 18.4 acres.

Habitat: Shermons Creek was surrounded by mostly forest (49%) with intermixed residential areas that contributed to most of the brush percentage (34%) (Table 13). The upstream reaches of Shermons Creek contained a large portion of the agricultural land, but most of the stream banks were relatively intact. Fifty-six percent of Shermons Creek drainage is pool habitat with the remaining 44% riffle-run habitat.

Four of twelve third order tributaries to Shermons Creek were included in the survey. These four were given priority because of relatively large discharge measurements taken at their confluence with Shermons Creek. McCabe Run and Green Valley Run flow through forested habitat for most of their length whereas much of Bixler Run and Bull Run flow through agricultural land.

Water Quality: There is one permitted municipal treatment plant in the Shermons Creek basin. DEP personnel report good water quality in this basin. Average pH in the main stream of Shermons Creek was 8.75. No measurements were taken in its tributaries.

Table 12. Impounded area due to man-made blockages on Shermans Creek drainage surveyed July 1996, Perry County.

Blockage identification code	Distance from mouth (miles)	Blockage height (feet)	Stream	Impounded area (acres)	Acres between blockages
PASHE001	17.30	4.0	Shermans Creek	18.4	80
PASHE002	22.55	3.0	Shermans Creek	4.9	63
PASHE003	26.30	8.0	Shermans Creek	16.6	49
PASHE004	30.30	2.0	Shermans Creek	7.1	95
PASHE005	20.50	1.0	McCabe Run	*	*
PASHE006	24.80	0.5	McCabe Run	0.04	2
PASHE007	29.45	12.0	Bixler Run	5.6	14

Table 13. Stream bank and substrate composition in the Shermans Creek drainage surveyed July 1996, Perry County.

Bank condition	Percent	Substrate	Percent
Forest	49	Fines	4
Brush	34	Sand or gravel	18
Grasses	11	Cobble	23
Riprap	4	Boulders	50
Eroding	2	Other	5

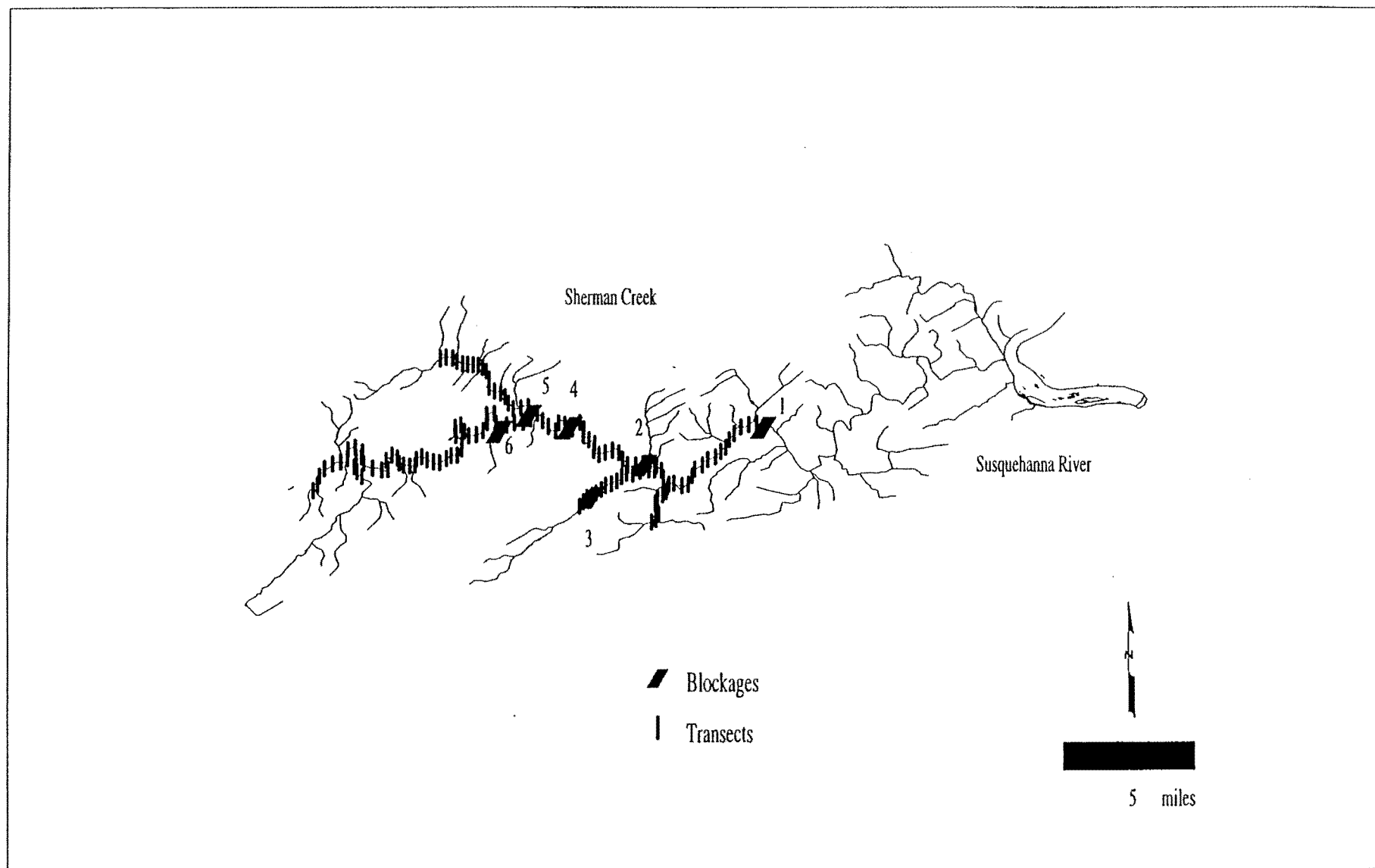


Figure 8. Transects and blockages surveyed on Sherman Creek, Perry County. Blockage numbers correspond with blockage identification numbers, e.g., 1 =PASHE001.

Appendix I. Summary of blockages on streams within the Susquehanna drainage surveyed May 1996-July 1996.

ID	Stream name	River mile	Height (feet)	Type	Comment
PASWA001	Swatara Creek	2.25	1.0-3.0	DM	Concrete- not much vertical drop
PASWA002	Swatara Creek	14.38	6.0	DM	Concrete
PASWA003	Swatara Creek	38.13	2.0	DM	Concrete
PASWA004	Swatara Creek	59.13	2.0-3.0	OT	Natural cataract
PASWA005	Little Swatara Creek	12.75	1-4	OT	Debris pileup
PACGT001	Conodoguinet Creek	13.38	5.5	DM	Concrete
PACGT002	Conodoguinet Creek	35.51	8.0	DM	Concrete
PACGT003	Conodoguinet Creek	46.51	5.6	DM	Concrete
PACGT004	Conodoguinet Creek	52.89	7.6	DM	Concrete
PASHE001	Shermans Creek	17.30	4.0	DM	Concrete
PASHE002	Shermans Creek	24.75	3.0	DM	Rock
PASHE003	Shermans Creek	29.50	2.0	DM	Concrete and boulder
PASHE004	Shermans Creek	34.40	8.0	DM	Concrete
PASHE005	McCabe Run		1.0	DM	Wooden
PASHE006	McCabe Run		0.5	DM	Concrete
PASHE007	Bixler Run	0.38	12.0	DM	Concrete
PAFIY001	Fishing Creek (York)	0.80	4.0	DM	Railroad ties supported by concrete
PAFIY002	Fishing Creek (York) South Branch	2.10	1.0	DM	Plastic liner and rocks
PAFIY003	Fishing Creek (York)	3.95	1.0	DM	Steel plate supported by concrete
PAFIP001	Fishing Creek (Perry)	1.10	2.0	DM	Rocks
PAFIP002	Fishing Creek (Perry)	2.95	2.0	DM	Rocks and wood
PAFIP003	Fishing Creek (Perry)	7.45	0.0-1.0	PC	In concrete bridge
PAFIP004	Fishing Creek (Perry)	8.30	0.0-1.0	PC	In concrete bridge
PAFIP005	Fishing Creek (Perry)	8.42	0.0-1.0	PC	Under road
PAYBR001	Yellow Breeches Creek	0.20	7.0	DM	New Cumberland Boro Park
PAYBR002	Yellow Breeches Creek	3.20	3.0	DM	Green Lane Rd. bridge
PAYBR003	Yellow Breeches Creek	5.30	6.0	DM	Spanglers Mill Rd. bridge
PAYBR004	Yellow-Breeches-Creek	13.3	3.5	DM	

PAYBR005	Yellow-Breeches-Creek	19.9	2.0	DM	20 YDS above RR bridge
PAYBR006	Yellow-Breeches-Creek	20.7	4.0	DM	Just above Gettysburg Pike
PAYBR007	Yellow-Breeches-Creek	24.3	5.5	DM	1/4 mile upstream of York bridge
PAYBR008	Yellow-Breeches-Creek	26.8	3.5	DM	
PAYBR009	Yellow-Breeches-Creek	27.8	2.0	DM	Allenberry Playhouse
PAYBR010	Yellow-Breeches-Creek	28.9	4.5	DM	
PAYBR011	Yellow-Breeches-Creek	33.7	2.5	DM	1.25 mi downstream of burnt House Rd.
PAYBR012	Yellow-Breeches-Creek	34.1	2.0	LD	3/4 mi downstream of burnt House Rd.
PAYBR013	Yellow-Breeches-Creek	41.8	1.0	PX	At Huntsdale Hatchery bridge

<u>Conodoguinet</u>	White, Thomas J.	Weaver, Deborah A.
<u>Blockages:</u>	1032 Mill Road	5655 Creekview Road
	Mechanicsburg, PA	Mechanicsburg, PA
	17055	17055
<u>First Blockage</u>		
<u>(PACGT001)-</u>		
<u>Impounded Riparian</u>	Cook, William H.	Bramwell, Edward W. II
<u>Land Owners:</u>	1036 Mill Road	5665 Creekview Road
	Mechanicsburg, PA	Mechanicsburg, PA
	17055	17055
Gross, Martin E.*		
P.O. Box 185		
Camp Hill, PA 17011	Bretz, Ulysses W.	Taylor, William H. Jr.
	1040 Mill Road	5683 Creekview Road
Good Hope Mills	Mechanicsburg, PA	Mechanicsburg, PA
Incorporated	17055	17055
Ulysses Bretz		
1040 Mill Road	Moser, Neal G.	Hebbard, Richard M. Jr.
Mechanicsburg, PA	1044 Mill Road	5685 Creekview Road
17055	Mechanicsburg, PA	Mechanicsburg, 17055
	17055	
Ellenberger, Robert L.		Butler, Linda T.
1012 Mill Road	Erford, Wayne A.	3610 Cloverfield Road
Mechanicsburg, PA	George M. Rudy	Harrisburg, PA 17109
17055	703 Ohio Ave.	
	Lemoyne, PA 17043	Terry, James A.
Snyder, Robert L.		5605 Hillside Lane
1016 Mill Road	Wintermeyer, Barry G.	Mechanicsburg, PA
Mechanicsburg, PA	1044 Mill Road	17055
17055	Mechanicsburg, PA	
	17055	Monegan, Richard E, Jr.
Kramer, Steven R.		130 S. 3rd Street. Ph 15
1020 Mill Road	Yost, Cheryl R.	Harrisburg, PA 17101
Mechanicsburg, PA	Cheryl Garman	
17055	P.O. Box 35	Zuch, Terry James
	Mechanicsburg, PA	5275 Terrace Road
Braveman, Barry J.	17055	Mechanicsburg, PA
1024 Mill Road		17055
Mechanicsburg, PA	Hale, Corwin C.	
17055	5615 Creekview Road	Henry, Kurt L.
Hassinger, Kirk R	Mechanicsburg, PA	512 Woodcrest Drive
238 W. Simpson Street	17055	Mechanicsburg, PA
Mechanicsburg, PA		17055
17055	Roberts, Charles I.	
	5645 Creekview Road	
	Mechanicsburg, PA	
	17055	

Morrison, Timothy J.
514 Woodcrest Drive
Mechanicsburg, PA
17055

Nelson, Robert P.
516 Woodcrest Drive
Mechanicsburg, PA
17055

Daeschner, William E.
9200 Claytonia Lane
Annandale, V.A. 22003

Fultz, Scott A.
508 Woodcrest Drive
Mechanicsburg, PA
17055

Standrowicz, Stephen
506 Woodcrest Drive
Mechanicsburg, PA
17055

Marisco, Francis A.
504 Woodcrest Drive
Mechanicsburg, PA
17055

Mackellar, Bruce
502 Woodcrest Drive
Mechanicsburg, PA
17055

Luisi, Joseph F.
500 Woodcrest Drive
Mechanicsburg, PA
17055

Layne, John B.
498 Woodcrest Drive
Mechanicsburg, PA
17055

Poppe, Ty Lane
496 Woodcrest Drive
Mechanicsburg, PA
17055

Antani, Ramesh L.
494 Woodcrest Drive
Mechanicsburg, PA
17055

Switzer, Nancy K.
492 Woodcrest Drive
Mechanicsburg, PA
17055

Boarman, Gerald J.
478 Woodcrest Drive
Mechanicsburg, PA
17055

Webb, Ronald E.
476 Woodcrest Drive
Mechanicsburg, PA
17055

Petri, Henry A.
474 Woodcrest Drive
Mechanicsburg, PA
17055

Heath, George R.
472 Woodcrest Drive
Mechanicsburg, PA
17055

Rimmer, William D.
470 Woodcrest Drive
Mechanicsburg, PA
17055

Wharton, John W.
468 Woodcrest Drive
Mechanicsburg, PA
17055

Rachford, Thomas M.
466 Woodcrest Drive
Mechanicsburg, PA
17055

Milliken, Luther G.
2507 Hoffer St.
Harrisburg, PA 17101

Stroud, Richard L.
2947 Wilson Parkway
Harrisburg, PA 17104

Barton, Ronald Jr.
720 E. Birch Street
Palmyra, PA 17078

Conley, Kenneth R.
5865 Hillside Lane
Mechanicsburg, PA
17055

Moore, John D.
5855 Hillside Lane
Mechanicsburg, PA
17055

Zeigler, Paul F.
5845 Hillside Lane
Mechanicsburg, PA
17055

Pearce, Eustace S.
5835 Hillside Lane
Mechanicsburg, PA
17055

Kitzmiller, Barry E.
5815 Hillside Lane
Mechanicsburg, PA
17055

Porterfield, Eugene E.
1068 Summit Drive
Greensburg, PA 15601

Gebert, Michael J.
5765 Hillside Lane
Mechanicsburg, PA
17055

Kelley, William F.
5755 Hillside Lane
Mechanicsburg, PA
17055

Erickson, John
5735 Hillside Lane
Mechanicsburg, PA
17055

Village Associates II
431 Wren Court
Mechanicsburg, PA
17055

Matisse, Paul A.
5705 Hillside Lane
Mechanicsburg, PA
17055

Kaufman, Debra A.
5665 Hillside Lane
Mechanicsburg, PA
17055

Gill, Richard D.
507 Dewitt Ave.
Harrisburg, PA 17109

Rupp, Dianne D.
5645 Hillside Lane
Mechanicsburg, PA
17055

Second Blockage
(PACGT002)
Impounded Riparian
Land Owners:

Pennsylvania Power and
Light Company*
53 W. South Street
Carlisle, PA 17013

Kuhn, Albert C.
240 Springview Road
Carlisle, PA 17013

Hall, James S.
1071 Rockledge Drive
Carlisle, PA 17013

Davis, Madeline A.
74 Cave Hill Drive
Carlisle, PA 17013

Lucabaugh, Kathaleen
66 Cave Hill Drive
Carlisle, PA 17013

Jumper, David E.
62 Cave Hill Drive
Carlisle, PA 17013

Morrison, Leon C.
337 Lincoln Street
Carlisle, PA 17013

Bolden, John A. III
46 Cave Hill Drive
Carlisle, PA 17013

Kendel, Thomas M.
38 Cave Hill Drive
Carlisle, PA 17013

Brenneman, Kay I.
30 Cave Hill Drive
Carlisle, PA 17013

Milkes, Samuel W.
14 Cave Hill Drive
Carlisle, PA 17013

Maxwell, Kathleen
8 Cave Hill Drive
Carlisle, PA 17013

Hall, James S.
1071 Rockledge Drive
Carlisle, PA 17013

Miller, Ray
1031 Waggoners Gap
Road
Carlisle, PA 17013

Hall, James S.
1071 Rockledge Drive
Carlisle, PA 17013

Deitch, Melvin J.
95 Channel Drive
Carlisle, PA 17013

Kennedy, Albert E.
1011 Charles Street
Mechanicsburg, PA
17055

Haulman, John W.
89 Channel Drive
Carlisle, PA 17013

Suhr, Ida M.
87 Channel Drive
Carlisle, PA 17013

Slusser, Albert E.
83 Channel Drive
Carlisle, PA 17013

Koons, Dolores K.
310 Hollowbrook Road
Carlisle, PA 17013

Copenhaver, Ronald E.
71 Channel Drive
Carlisle, PA 17013

Deranie, Lester L.
65 Channel Drive
Carlisle, PA 17013

Gillaugh, Ray
69 Channel Drive
Carlisle, PA 17013

Enck, Arthur V.
307 Forge Road
Boiling Springs, PA
17007

Byers, William J.
1138 Franklin Street
Carlisle, PA 17013

Bailey, Eugene
25 Channel Drive
Carlisle, PA 17013

Heckert, William F.
17 Channel Drive
Carlisle, PA 17013

Hittie, David L.
121 Channel Drive
Carlisle, PA 17013

Tanger, John
133 Channel Drive
Carlisle, PA 17013

Otto, Robert F.
3680 Spring Road
Carlisle, PA 17013

Shelar, Thomas H.
1521 Terrace Ave.
Carlisle, PA 17013

Bowermaster, Sidney P.
134 S. Bedford Street
Carlisle, PA 17013

Sloop, Harold
107 Channel Drive
Carlisle, PA 17013

Bookwalter, Homer P.
101 Channel Drive
Carlisle, PA 17013

Eiben, Susanne C.
926 E. Oak Street
Palmyra, PA 17078

Third Blockage-
(PACGT003)
Impounded Riparian
Land Owners:

Foshag, William F.*
1206 Creek Road
Carlisle, PA 17013

Warner, Jane O.
825 Burgner Road
Carlisle, PA 17013

Shreiner, James G.
346 Old Mill Road
Carlisle, PA 17013

Stoner, Larry C.
352 Old Mill Road
Carlisle, PA 17013

Heckendorn, Earl L.
1222 Creek Road
Carlisle, PA 17013

Palmer, Robert C.
1216 Creek Road
Carlisle, PA 17013

Line, Arthur A.
1271 Creek Road
Carlisle, PA 17013

Snyder, Paul B.
1244 Creek Road
Carlisle, PA 17013

Fourth Blockage-
(PACGT004)
Impounded Riparian
Land Owners:

Rood, Elizabeth*
314 Center Road
Newville, PA 17241

Manwaring, Alan D.
% Max Manwaring
226 Conway Street
Carlisle, PA 17013

Failor, Paul H.
141 Creek Road
Newville, PA 17241

Butts, Margaret H.
1 Mt. Rock Road
Newville, PA 17241

Barrick, Harry C. Jr.
455 Center Road
Newville, PA 17241

Baughman, Leroy
747 Bloserville Road
Newville, PA 17241

Mowery, James P.
340 Center Road
Newville, PA 17241

Yellow Breeches

Blockages:

First Blockage -

(PAYBR001)

Impounded

Riparian Land Owners:

Pan American Water
Co.
Riverton Consolidated
Water Co.
800 W. Hershey
Hershey, PA 17033

Pennsylvania American
Water Co.
Meadow Brook Rd
Camp Hill, PA 17011

Pennsylvania Power and
Light Company*
53 W. South Street
Carlisle, PA 17013

Chomyn, Bertha
111 Meadowbrook Rd.
Camp Hill, PA 17011

Smith, George E. &
Louise, Smith
113 Meadowbrook Rd.
Camp Hill, PA 17011

Stuart Anthony &
Marian
305 York Rd

Second Blockage-
(PAYBR002)

Impounded

Riparian Land Owners:

Castillo, John
102 Old Ford Rd
Camp Hill, PA 17011

Smeltzer, Pamela
104 Old Ford Rd
Camp Hill, PA 17011

Gates, Curtis & Lori
106 Old Ford Rd
Camp Hill, PA 17011

Esser, Richard & Betsy
108 Old Ford Rd
Camp Hill, PA 17011

Baker, William &
Shirley
112 Old Ford Rd
Camp Hill, PA 17011

Ridge, Chester & Marie
114 Old Ford Rd
Camp Hill, PA 17011

Fritz, Curtis
116 Old Ford Rd
Camp Hill, PA 17011

Area Reserved for
Recreation (No address)

Fickel, James
124 Old Ford Rd
Camp Hill, PA 17011

Miller, Walter
122 Old Ford Rd
Camp Hill, PA 17011

Synder, Andrew &
Bonnie
126 Old Ford Rd
Camp Hill, PA 17011

Levin, Lewis & Peggy
128 Old Ford Rd
Camp Hill, PA 17011

Fetrow, George &
Sandra
130 Old Ford Rd
Camp Hill, PA 17011

Dewane, William &
Claudia
132 Old Ford Rd
Camp Hill, PA 17011

Law, Charles
134 Old Ford Rd
Camp Hill, PA 17011

Davis, Arthur & Frances
136 Old Ford Rd
Camp Hill, PA 17011

Barlow, J.C. & Linda
138 Old Ford Rd
Camp Hill, PA 17011

Kennedy, James
140 Old Ford Rd
Camp Hill, PA 17011

Norford, Edward
142 Old Ford Rd
Camp Hill, PA 17011

Rife, Richard
144 Old Ford Rd
Camp Hill, PA 17011

Rodger, J.
148 Old Ford Rd
Camp Hill, PA 17011

Schierscher, Anton
150 Old Ford Rd
Camp Hill, PA 17011

Barnes, Ronald
152 Old Ford Rd
Camp Hill, PA 17011

Hall, Robert
154 Old Ford Rd
Camp Hill, PA 17011

Byrne, Dennis
156 Old Ford Rd
Camp Hill, PA 17011

Lighter, Linn
158 Old Ford Rd
Camp Hill, PA 17011

Baublitz, Paul C Jr. and
Audrey T.
15 Green Lane Dr.
Camp Hill, PA 17011

Gregory, Mark W. and
Maria A. Giannaris
20 Green Lane Dr.
Camp Hill, PA 17011

Free, Lloyd F.
121 Old Mill Dr.
Camp Hill, PA 17011

Logan, William M. and
Maria L.
123 Old Mill Dr.
Camp Hill, PA 17011

Martin, George A. and
Carol A.
117 Old Mill Dr.
Camp Hill, PA 17011

Ripple, Richard A. Jr.,
113 Old Mill Dr.
Camp Hill, PA 17011

Berner, Clarence T. and
Phoebe E.
109 Old Mill Dr.
Camp Hill, PA 17011

Miller, James J. and
Sally
105 Old Mill Dr.
Camp Hill, PA 17011

Lenda, Edwin R. Jr. and
Barbara R.
21 Cedar Cliff Dr.
Camp Hill, PA 17011

Hempt Brothers Inc.
201 (205) Creek Rd.
Camp Hill, PA 17011

Third Blockage-
(PAYBR003)
Impounded
Riparian Land Owners:

Camp Hill Correctional
Inst.
PA Industrial School
Camp Hill, PA 17011

Hempt Brothers Inc.*
1320 Spanglers Mill Rd.
Camp Hill, PA 17011

Hetrick, Ferne
100 Spangler Mill Rd.
New Cumberland, PA
17070

Fourth Blockage -
(PAYBR004)
Impounded Riparian
Land Owners:

West Shore Soccer
Club, Inc.*
P.O. Box 334
New Cumberland, PA
17070

Katusha, William G. and
Kathy
1624 Main St.
Mechanicsburg, PA
17055

Ritchey, Donald M. and
Debra S.
1608 Liz Burns Place
Mechanicsburg, PA
17055

Scassero, Thomas J. and
Gladys G.
1604 Liz Burns Place
Mechanicsburg, PA
17055

Leber, Frank J. and
Linda
1600 Liz Burns Place
Mechanicsburg, PA
17055

Lisburn Community
Fire Co.
1800 Main St.
Mechanicsburg, PA
17055

Lisburn Community
Cemetery
Mechanicsburg, PA
17055

Trimmer, Paul
1047 Trimmer, Dr.
Lewisberry, PA 17339

Little, Myrtle
Brenneman Dr.
Mechanicsburg, PA
17055

Fifth Blockage-
(PAYBR005)
Impounded
Riparian Land Owners:

Narter, Perry
Al Pat Rd
Dillsburg, PA 17019

Bair, Scott & Vicki
Jessica Lane
Dillsburg, PA 17019

Besserman, James
Grantham Crossing
Dillsburg, PA 17019

Richwine, Robert
RD 3
Dillsburg, PA 17019

Oringer, Hal and
Kathleen Billings
2800 Forest Dr.
Des Moines, IA 50312

Replogle, Bradley S.
P. O. Box 149
819 Grantham Rd.
Grantham, PA 17027

Sixth Blockage -
(PAYBR006)
Impounded Riparian
Land Owners:

Adams, Donald C. Jr.
and Margaret D.
1138 & 1140 Gettysburg
Pike
Mechanicsburg, PA
17055

Adams, Donald
RD 3
Dillsburg, PA 17019

Kessinger, Thomas
3 Sheffield Rd
Dillsburg, PA 17019

Ayers, John
2 Sheffield Rd
Dillsburg, PA 17019

Fawber, Graig E. and
Barbara Nell
1017 Grantham
Grantham, PA 17027

Seventh Blockage-
(PAYBR007)
Impounded
Riparian Land Owners:

Sola, Julio I. & Cheryl
L. Parry
1181 York Rd.
Mechanicsburg, PA
17055

Plowman, John W. Jr.
and Wendy L.
1186 Creek Rd.
Mechanicsburg, PA
17055

Roth, Linda M.
512 Creekview Lane
Mechanicsburg, PA
17055

Swartz, Harold W. and
Mary L.
1183 York Rd.
Mechanicsburg, PA
17055

Keefer, David N. Jr.,
and Jean L.
413 Main St.
Mechanicsburg, PA
17055

Davis, Robert H.
508 Creekview Lane
Mechanicsburg, PA
17055

Eighth Blockage-
(PAYBR008)
Impounded Riparian
Land Owners:

Leising, Charles, E. and
Helen M.
441 Long Rd.
Boiling Springs, PA
17007

Chronister, Paul W. and
Esther B.
1322 Leidigh Dr.
Boiling Springs, PA
17007

Weber, Jay F. and
Dessie
1387 Lutztown Rd.
Boiling Springs, PA
17007

Cockley, Louise L.
257 Tanglewood Rd.
Hot Springs, AR 71913

S. Middleton Township
345 Criswell
Boiling Springs, PA
17007

Ninth Blockage-
(PAYBR009)
Impounded Riparian
Land Owners:

Allenberry, Inc.
P.O. Box 7
Boiling Springs, PA
17007

Dixon, Lottie I.
P.O. Box 6
Boiling Springs, PA
17007

Laffey, William and
Jane Ann
101 Bucker Hill
P.O. 500
Boiling Spring, PA
17007

Tenth Blockage-
(PAYBR010)
Impounded Riparian
Land Owners:

S. Middleton Township
520 Park Dr.
Boiling Spring, PA
17007

Brenneman, Earl L. and
Evelyn T.
321 W. 1st St.
Boiling Spring, PA
17007

Walters, John L. and
Della
588 Park Dr.
Boiling Spring, PA
17007

Barnes, Randy & Cindi
Plasterer
203 Race St.
Boiling Spring, PA
17007

Livelsberger, Nancy A.
584 Park Dr.
Boiling Spring, PA
17007

Line Greg R. and
Pamela
582 Park Dr.
Boiling Spring, PA
17007

Prescott, David A.
580 Park Dr.
Boiling Springs, PA
17007

Dickinson College
Carlisle, PA 17013

Eleventh (PAYBR011)
through Thirteenth
(PAYBR013) Blockages
Impounded Riparian
Land Owners:

Blockages cannot be
identified on overhead
photos

Swatara Blockages:

First Blockage-
(PASWA001)
Impounded Riparian
Land Owners:

Lauver, Lauren L.
P.O. Box 305
Middletown, PA 17057

Mock, Susan R.
1340 Vine Street
Middletown, PA 17057

Pickel, Charles M.
7 2nd Street
Highspire, PA 17034

Pickel, Ronald C.
1356 Vine Street
Middletown, PA 17057

Davis, Frances N.
95 Newberry Road
Middletown, PA 17057

Johnson, Glenn
P.O. Box 91
670 Swatara Creek Road
Middletown, PA 17057

Brinser, Alan R.
P.O. Box 137
Middletown, PA 17057

Krulac, David A.
P.O. Box 1064
Mechanicsburg, PA
17055

Wilson, Henry W.
995 Swatara Creek Road
Middletown, PA 17057

Gibney, Larry
RD#1 Box 407 E
Etters, PA 17319

Shields, David H.J.
10 Bald Cypress Circle
Etters, PA 17319

Pennwood Housing &
Dev.
3 Center Drive
Camp Hill, PA 17011

Deangelis, Daniel A
30 Bald Cypress Circle
Etters, PA 17319

Terado Luis E.
40 Bald Cypress Circle
Etters, PA 17319

Mimnall, John J.
50 Bald Cypress Circle
Etters, PA 17319

Third Blockage-
(PAFIY003) Impounded
Riparian Land Owners:

Mueller, John*
RD# 2 Box 476-A
Etters, PA 17319

Grove, Patricia A.
685 Pine Road
Etters, PA 17319

Leggett, Chas E.
Barone, Henry A.
2956 Pines Road
Etters, PA 17319

Shermans Creek
Blockages:

First Blockage
(PASHE001)-
Impounded riparian
Land Owners:

Carson Long Military
Institute*
P. O. Box 98
New Bloomfield, PA
17068

Campbell, William H. et
al.
RR 1
P. O. Box 476-I
Landisburg, PA 17040

Swab, Robert L.
428 Landisburg Rd.
Shermans Dale, PA
17090

Railing, Alvin L.
519 Burgners rd.
Carlisle, PA 17013

Boughter, George C.
404 Landisburg Rd.
Shermans Dale, PA
17090

Rogers, Richard
Rd. 2
P. O. Box 303-A
Shermans Dale, PA
17090

Crone, John F.
203 Creekview Farms
Shermans Dale, PA
17090

Horn, David J.
RR 2
P. O. Box 300
Shermans Dale, PA
17090

Wheeler, Claude Sr.
P. O. Box 447
Lemoyne, PA 17043

Keller, Frances M.
305 Landisburg Rd.
Shermans Dale, PA
17090

Geistwhite, Barbara K.
18 Circle Dr.
Carlisle, PA 17013

Jenkins, Marvin D.
Rd. 4
P. O. Box 4155
Glen Rock, PA 17327

Second Blockage
(PASHE002)-
Impounded Riparian
Land Owners

Wentzel, David H. *
Rd. 1
Landisburg, PA 17040

Moore, Thomas
Rd. 1
P. O. Box 869
Landisburg, PA 17040

Potteiger, Richard A.
Rd. 1
P. O. Box 345
Landisburg, PA 17040